






Attachment, motivational systems and anorexia nervosa: A systematic review and proposed framework for eating disorders

José Miguel Budia¹  | Carlos María Alcover¹  | Juan José Fernández-Muñoz¹  | Ascensión Blanco-Fernández²  | Miriam P. Félix-Alcántara³ 

¹Department of Psychology, Rey Juan Carlos University, Madrid, Spain

²Department of Psychology, Universidad Europea, Madrid, Spain

³Infanta Leonor University Hospital, Madrid, Spain

Correspondence

José Miguel Budia and Juan José Fernández-Muñoz, Department of Psychology, Rey Juan Carlos University, Avenida de Atenas, s/n, Alcorcón, Madrid 28922, Spain.
Email: jm.budia@alumnos.urjc.es; juanjose.fernandez@urjc.es

Abstract

Introduction: There is a direct association between patients with insecure attachment style (IAS), behavioural inhibition (BIS) and behavioural activation (BAS) motivational systems, and anorexia nervosa (AN). However, the possible direct relationships between these three variables have not been studied.

Objective: The main objective of this study is to analyse the relationship between these variables and propose a framework for analysing and understanding these relationships.

Methodology: A systematic review was carried out following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines, searching the following terms: ‘anorexia’, ‘attachment’ and those related to motivational systems. The final search was limited to publications in English dated between 2014–2022 for ‘anorexia and attachment’ and 2010–2022 for ‘anorexia and BIS/BAS’.

Results: Of the 587 articles retrieved, 30 were included in this study for the textual data analysis of the relationship between anorexia and attachment (17), anorexia and motivational systems (10) and anorexia, attachment and motivational systems (3). An association between avoidant IAS, AN and hypersensitivity to punishment of the BIS was observed in the analysis. A relationship was also observed with hyperreinforcement sensitivity of the BAS. After reviewing the articles, a possible relationship between the three factors, along with other mediating factors, was found.

Discussion: AN is directly related to the avoidant IAS and to BIS. Similarly, bulimia nervosa (BN) was directly related with anxious IAS and BAS. However, contradictions were found in the BN–BAS relationship. This study proposes a framework for analysing and understanding these relationships.

KEYWORDS

anorexia nervosa, attachment, family, motivational systems, trauma

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2023 The Authors. *Clinical Psychology & Psychotherapy* published by John Wiley & Sons Ltd.

1 | INTRODUCTION

Previous research has identified various factors related to the causes of eating disorders (EDs) and successful treatment of these disorders (Cassioli et al., 2022; Harrison et al., 2016; Tasca & Balfour, 2014). Among these causes are family (Münch et al., 2016; Wallis et al., 2018) and personality characteristics (Martinussen et al., 2017). Consequently, empirical evidence shows that these factors can play a relevant role in both the cause of EDs and the efficacy of their treatment both on their own and in combination with each other.

1.1 | EDs and family factors

EDs, including anorexia nervosa (AN), bulimia nervosa (BN), binge ED (BED) and ED not otherwise specified (EDNOS), are psychiatric disorders in which family dynamics are a relevant cause (Gismero, 2020; Quiles et al., 2013; Wallin & Saha, 2020). Family structure and relationship styles may be relevant in treatment as well (Fox et al., 2017; Gismero, 2020; Linardon et al., 2018; Quiles et al., 2013). Therefore, the treatment of EDs from a family perspective can be essential for success, both to overcome the disorder and to maintain the effects of subsequent psychotherapy (Couturier et al., 2013; Wallin & Saha, 2020).

One of the core elements of family dynamics is the attachment style (Cortés-García et al., 2021; Oldham-Cooper et al., 2021). The caregiver's supporting style and the type of relationship between parents and children impact children's responses and adaptations to their environment (Cortés-García et al., 2021; Forsén et al., 2019). According to Bowlby's theory (Bowlby, 1979; Brumariu & Kerns, 2010), secure attachment style (SAS) provides the optimal balance between providing a secure base of protection and an autonomous exploration system. Within this safe environment, the person can seek the caregivers support when they feel that they need help. In the exploration system, the person explores and understands their environment without the help of caregivers. SAS is understood to be a protective approach to caregiving for mental health (Barg, 2011). Insecure attachment styles (IASs), by contrast, are defined as styles that create an imbalance between the secure base and the exploration system. IAS, according to Bowlby (1979) and Ainsworth et al. (2015), can be divided into three substyles:

- Avoidant attachment: The person prefers the exploration system to regulate themselves and does not rely on the caregivers to regulate their behaviour, resulting in them appearing cold and distant in their presence.
- Anxious attachment: The person is not able to relax in the presence or in the absence of the caregivers.
- Disorganized or unresolved (Main & Solomon, 1990), characterized by reacting with apparently incompatible behaviours in the presence of caregivers.

Key Practitioner Message

- During the Covid-19 lockdown, an increase in eating disorder incidence was observed.
- With the need to quarantine, more interaction with families with insecure attachment styles occurred, during which family conflict may have increased.
- Analysing the role of hypersensitivity to interpersonal rejection and the use of food as a reinforcement can help understand the increasing prevalence and severity of cases.
- New longitudinal studies are needed that analyse the relationship between attachment, motivational systems and eating disorders, also focusing on to the trauma variable, and the possibility of understanding attachment as a dimensional variable.

All IASs have been associated with other psychopathologies, such as the ED (Keating et al., 2016; Szalai, 2020).

1.2 | EDs and personality characteristics

Personality factors are important in the treatment of ED (Martinussen et al., 2017). There is evidence that maladaptive perfectionism, high levels of neuroticism, and obsessive or rigidity of thought are common elements in people with EDs (Dakanalis et al., 2014; Lazarević et al., 2016; Martinussen et al., 2017; Münch et al., 2016). One of the personality theories that have been correlated to EDs is Gray's personality motivational systems theory (Becerra, 2010; Gray, 1970). Combining motivational systems with personality dimensions from Eysenck's model, Gray proposes two systems:

- Behavioural inhibition system (BIS) composed of anxiety, including introversion and neuroticism, and
- Behavioural activation system (BAS) composed of impulsivity, including extroversion and neuroticism (Becerra, 2010; Gray, 1970).

There are two BIS subscales, anxiety and fear, and three BAS subscales, reward responsiveness, drive and the fun seeking (Harrison et al., 2016).

According to this theory, people with high levels of BIS are more sensitive to punishment, whereas high levels of BAS are more sensitive to reinforcement (Becerra, 2010; Gray, 1970; Keating et al., 2016). According to this model, introverted people are more susceptible to BIS because they are more sensitive to punishment (Squillace et al., 2011) and, because of that, they tend to inhibit themselves. In contrast, extroverts are associated with BAS because they are more sensitive to reinforcement; thus, their personality makes them more actively seek social reinforcement (Becerra, 2010;

Keating et al., 2016; Squillace et al., 2011). In personality studies from motivational systems (e.g., Becerra, 2010), people diagnosed with AN, or other ED profiles based on food restriction, BIS is the predominant neurobiological system of activation. In contrast BN, or other ED profiles based on compulsive food intake and/or purging symptoms, high levels of activation of both BIS and BAS have been observed (Becerra, 2010).

1.3 | IAS and BIS and BAS

In Ochsner's (2008) model, social stimuli, such as interactions between caregivers and those cared for, lead to aversion or reinforcement feelings. These feelings can influence the attachment style that is generated from them (Huh et al., 2020; Ochsner, 2008). By exposing the neurobiological principles of affective learning, Ochsner (2008) highlights the medial prefrontal cortex and the insula as the limbic regions related to this learning process. The motivational process of approach-avoidance to the caregiver is also described in the Bowlby-Ainsworth attachment theory (Bowlby, 1979). In Ainsworth's strange situation procedure, they differentiate between attachment styles and affective regulation of the child by approaching or withdrawing behaviours with the caregiver (Rodríguez, 2008).

Attachment and motivational systems are two constructs that have a strong influence on mental health (Huh et al., 2020). In other disorders, such as depression, attachment and motivational systems have been identified as treatment risk factors, negatively affecting duration and prognosis (Huh et al., 2020). In addition, a positive relationship between BIS punishment sensitivity and BAS reinforcement sensitivity has been observed with anxious IAS (Huh et al., 2020; Shahzadi & Walker, 2022), BIS punishment sensitivity and the avoidant IAS (Lan & Wang, 2020; Shahzadi & Walker, 2022). Furthermore, BAS is negatively related to avoidant IAS (Huh et al., 2020; Shahzadi & Walker, 2022).

1.4 | IAS, BIS and BAS, and AN

Evidence indicates that there is a direct relationship between IAS and AN (Cortés-García et al., 2021; Forsén et al., 2019; Monteleone et al., 2017; Szalai, 2020), between BIS/BAS and AN (Becerra, 2010; Keating et al., 2016; Minnick et al., 2017; Murcia et al., 2009), and between IAS and BIS/BAS (Huh et al., 2020; Lan & Wang, 2020; Shahzadi & Walker, 2022). Based on this background and context, this study aims to identify the existence of possible joint relationships between the IAS, the BIS/BAS and AN.

There are antecedents to this study, such as the results obtained by Monteleone, Cardi, et al. (2018) who established a possible mediating role of BIS in the relationship between IAS and ED. Other evidence has been found by Dakanalis et al. (2014) and Münch et al. (2016), who found similar relationships (Dakanalis et al., 2014; Münch et al., 2016). However, this evidence is still scarce, and there is no

systematic review in published literature that explores the available data on the relationship between the three variables.

1.5 | Trauma and EDs

There is a widely studied association between history of family trauma and EDs (Rosenberg et al., 2023). For example, child abuse, specifically emotional abuse, is directly associated with eating psychopathologies (Tasca et al., 2013). Moreover, a mothers' experience of lack of affection seems to have a direct effect on a patient's body dissatisfaction (Grenon et al., 2016).

The prevalence of childhood trauma experienced by patients with AN (Gander et al., 2021; Murray & Holton, 2021; Pignatelli et al., 2017) suggests the need to analyse the possible relationship between childhood parenting styles and the formation of disorganized IAS (Lecannelier et al., 2011). Moreover, trauma is also related to BIS (Huh et al., 2020) and to appearance of bodily disconnection symptoms in AN (Gander et al., 2021; Murray & Holton, 2021).

The primary two aims of this study are as follows:

- To carry out a systematic review of the literature that identifies the possible relationships between IAS, motivational systems and AN and
- To propose a framework for family therapy with patients with AN and high levels of BIS, based on the results obtained in the review.

The proposed framework would be of clinical use due to the high comorbidity between AN and personality disorders with high BIS levels (Martinussen et al., 2017; Meyer, 2002).

2 | METHODOLOGY

2.1 | Design

This is a systematic review based on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) (Page et al., 2021). The search methodology consists of the following.

2.2 | Bibliographic search

PubMed, Scopus, MEDLINE and PsycINFO were used as sources. For the manual search, Google Scholar platform was used. These databases offer comprehensive coverage of research in psychology and neuropsychology of the relationships described from a psychological, social and neurophysiological perspective.

Initially, the publications between 1 January 2000 and 24 March 2022 were taken into account. Academic, experimental and review publications were also reviewed by tracking search terms in title/abstract. In the eligibility phase of the search, the date range was further narrowed to ensure the most current systematic review found related to the topic.

2.3 | Search strategy

The keywords used were ‘Anorexia AND attachment’; ‘Anorexia AND (BIS or BAS or FFS or “Reward Sensitivity” or “Punishment Sensitivity” or “Gray Personality Theory”); and ‘Anorexia AND Attachment AND (BIS or BAS or FFS or “Reward sensitivity” or “Punishment sensitivity” or “Gray Personality Theory”’).

2.4 | Eligibility criteria

All titles and abstracts that appeared in databases when entering the terms and operators were reviewed by one researcher and supervised by two other researchers. Publications were selected in the identification phase based on the following criteria.

2.4.1 | Inclusion criteria

1. Empirical review of academic publications.
 - 1.1 Based on the results found in the eligibility phase, inclusion criteria were further narrowed to the following: Only empirical academic publications that were carried out since the year of publication of the last review of each topic (A and B) were considered. Therefore, the date of the most recent similar review was selected for each of the relationships studied (A and B).
2. Explicit mention of the terms and the study of the relationship between the following variables between 1 January 2000 and 31 March 2022:
 - A. attachment–AN,
 - B. BIS/BAS–AN and
 - C. attachment–BIS/BAS–AN.
 - 2.1 In the eligibility phase, inclusion criteria were further narrowed to the based on time frame of studies published since the year of publication of the last review.
 - For A: from 1 January 2014 to 31 March 2022.
 - For B: from 1 January 2010 to 31 March 2022.
 - For C: no modifications due to lack of results.
3. Use of standardized instruments to assess attachment and BIS/BAS. AN may already be diagnosed when comparing experimental groups with the control group. The following instruments are considered valid for the standardized assessment of attachment:
 - Attachment Style Questionnaire (ASQ; Feeney et al., 1994);
 - Cartes Modèles Individuels de Relation (CAMIR, or the reduced version CaMir; Balluerka et al., 2011);
 - Adult Attachment Interview (AAI; George et al., 1996);
 - Experiences in Close Relationships (ECR; Brennan et al., 1998);
 - Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1989);
 - Kerns Security Scale (Kerns et al., 1996);
 - Parental Bonding Instrument (PBI; Parker et al., 1979);
 - Adult Attachment Scale (AAS; Collins & Read, 1990); and

- Relationship Scale Questionnaire (RSQ; Griffin & Bartholomew, 1994).

For the standardized evaluation of the motivational systems, the following instruments were considered valid:

- the BIS/BAS scales (Carver & White, 1994);
 - Sensitivity to Punishment and Sensitivity to Reward Questionnaire (Torrubia et al., 2001); and
 - Appetite Motivation Scale (AMS; Smillie & Jackson, 2005).
4. Studies with persons old enough to develop AN (not animals or babies).
 5. Publications in English.
 6. Attachment is studied within the family context.

2.4.2 | Selection criteria

The identification phase was carried out by reviewing the title and abstract of all the articles according to the inclusion criteria. Two additional researchers supervised both the search method and the choice of operators as well as the selected articles. In the screening phase, the title and abstract were also reviewed to make a first selection of the studies that fit the criteria.

In the eligibility phase, the title and abstract of the screened studies were reviewed, validating the use of standardized instruments with correct psychometric properties. Considering the data collected in this phase, the inclusion/exclusion criteria were further narrowed by adding the empirical review and date of publishing criteria and excluding review studies. In the inclusion phase, the full text was reviewed to confirm their admission to the textual data synthesis phase, ensuring an exhaustive compliance with the inclusion and exclusion criteria.

2.5 | Quality evaluation

The quality of included studies was assessed by the Newcastle–Ottawa Scale (Wells et al., 2014), a widely accepted and used scale for the analysis of the risk of bias in observational studies of these dimensions. This scale evaluates the selection of the sample, the comparability between studies and the determination of exposure and evaluates the risk of bias from 1 to 9. As a cut-off point, a score greater than 7 was considered as low risk of bias and less than 7 as high risk.

3 | RESULTS

In the identification phase, 1014 results were found entering the operators in the selected databases. Seven more results found through manual searches are also added. Out of the 1021 studies retrieved, 587 were left in the screening phase after duplicates were discarded. Of this pre-selection, for the eligibility phase, 161 records were screened based on the inclusion criteria (1)–(6), thus discarding 426 publications. To offer new empirical data from the latest reviews

and advance knowledge without overlapping the data with previous reviews, the inclusion criteria (1.1) and (2.1) were introduced, eliminating the temporary segment criterion of (2) from this phase. After analysing the data, 42 publications were chosen for full-text analysis, using the inclusion criteria (1.1), (2) and the time criteria of (2.1), and (3)–(6). For the textual data synthesis phase, 17 publications of relation A, 10 of relation B and 3 of relation C were included in the final analysis. After reading and analysing the selected studies, a narrative synthesis of the results was carried out. The studies included are grouped according to the associations under study. Figure 1 depicts the PRISMA flowchart of this search strategy.

3.1 | Relationship A between IAS and AN

All the studies included in this section are cross-sectional, except for two studies by Redondo and Luyten (2018, 2021) and Pace et al. (2016, 2017). The other studies did not measure disorganized IAS in their attachment assessment.

The study by Cascino et al. (2022) found that avoidant IAS was more frequent than anxious IAS in patients with AN. The results obtained by Katznelson et al. (2021) show 81.3% of IAS in their sample with AN, highlighting the avoidant subtype. Moreover, Amianto et al. (2022) found an association between anxious IAS and AN mediated by obsessive–compulsive symptoms, highlighting the higher prevalence of anxious IAS in AN compared to HC. The study by Monteleone et al. (2021) revealed that the IAS explained, together with the confidence in body sensations, 45% of the symptomatology in AN. Monteleone et al. (2019) found that those with EDs had high scores for anxious and avoidant IAS, emphasizing the high scores of both attachment styles in both AN and BN. However, the scores in BN of both IAS were lower than in AN. Monteleone, Patriciello, et al. (2018) found a greater positive correlation between avoidant IAS and the scores obtained for ED symptomatology in general than between the anxious IAS and these scores. A later study, conducted by Monteleone et al. (2017), revealed an association of anxious and avoidant IAS with AN and BN, suggesting a transdiagnostic approach when studying EDs. Furthermore, the studies by Redondo and Luyten

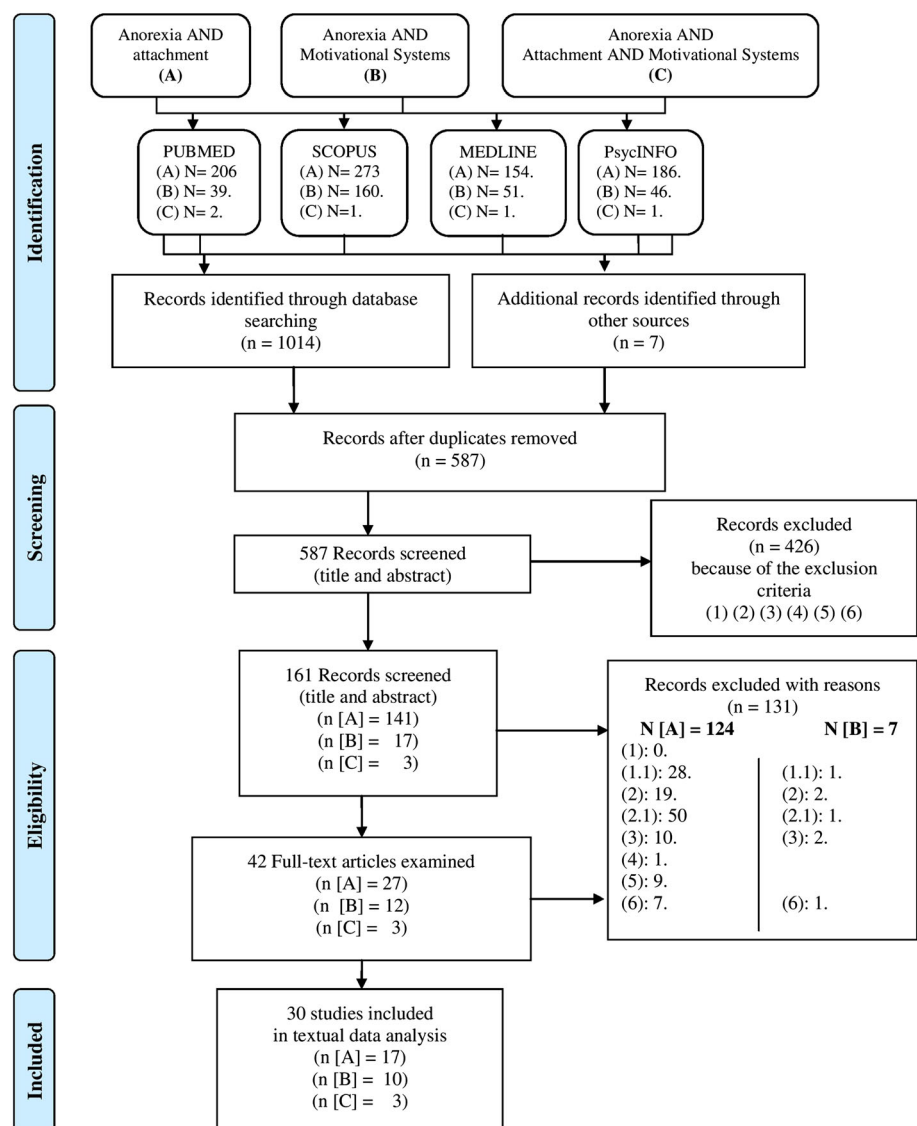


FIGURE 1 PRISMA flowchart of the search strategy.

(2018, 2021) showed a correlation between all IAS, including disorganized and AN symptomatology. In the 2021 study, avoidant IAS was more frequent in patients with restrictive AN than HC (Redondo & Luyten, 2021), while a positive correlation of AN symptomatology with disorganized IAS was also observed. In the 2018 study, alexithymia functioned as a total mediating variable in the IAS-AN association (Redondo & Luyten, 2018). The results of the study by Nalbant et al. (2020) showed lower levels of secure attachment in the AN clinical sample. Nandrino et al. (2020) observed in their AN sample a greater presence of anxious and avoidant IAS, in addition to lower competencies for intrapersonal emotional management skills compared to the HC. Batista et al. (2018) found higher levels of anxious and avoidant IAS in the sample with AN than in the healthy control group (HC). In the study by Pace et al. (2017), it was found that the associations of avoidant and disorganized IAS with AN were greater when compared to the HC. Finally, Pace et al. (2016) observed higher levels of the anxious, avoidant and disorganized IASs in their sample with AN compared to the HC.

The studies show a clear association between IAS and AN, in some cases offering mediating variables, such as alexithymia (Redondo & Luyten, 2018) and obsessive-compulsive rigidity (Amianto et al., 2021). There are other elements to consider, such as the recommendation of a transdiagnostic approach in the study of EDs (Monteleone et al., 2017), lower intrapersonal skills and interpersonal management (Nandrino et al., 2020), and the limited study of the relationship between disorganized IAS and AN or other ED.

Table 1 shows the information of 14 of the 17 articles that studied relationship A. The three articles that were found through the search for A but that studied relationship C are described in the C section.

3.2 | Relationship B between AN and BIS or BAS

The studies described in this section are all cross-sectional with the exception of the study by Harrison et al. (2016), which carried out a longitudinal study with one measurement before treatment and another after treatment. The study observed that BIS levels were higher in the AN group compared to the HC. This difference was maintained after the recovery of people with AN. As for BAS, the study found lower values in AN than in HC; however, the difference was insignificant (Harrison et al., 2016).

Of the cross-sectional studies, the results obtained by King et al. (2021) observed a negative correlation between body mass index (BMI), BIS and the severity of symptoms of AN. The study also observed better cognitive capacity in people with low BIS. However, Jonker et al. (2020) found a robust association between BIS levels and the severity of AN. Bernardoni et al. (2018) observed, through magnetic resonance imaging (MRI), selective changes in the neural bases of punishment in AN, which were greater when compared to HC. In addition, Kanakam et al. (2017) found in their study that people with AN had lower BAS level than HC. It also observed a negative correlation between BMI and BIS, duration of AN and BAS, fasting and BAS, age and BAS and the abuse of laxatives and BAS, and finally positive

correlations between appetitive motivation and BAS. They also found genetic influence in studies of twins with AN regarding BAS, with similarly low BAS scores between monozygotic twins in the experimental group compared to the HC (Kanakam et al., 2017). Monteleone et al. (2014) showed higher BIS levels in AN compared to HC and did not observe intragroup or intergroup differences in BAS levels. Moreover, the results of the study by Glashouwer et al. (2014) showed a greater association in the binge/purge AN subtype than in the restrictive AN subtype within the association between BIS-AN. They also observed high scores of BAS in both AN subtypes, establishing the possibility that AN functioned as a predictor of the hypersensitive motivational system. Giel et al. (2013) compared patients with AN compared to two HCs, one from athletes and the other from non-athletes. The levels of BAS and attentional fixation towards stimuli associated with physical activity were higher in people with AN compared to an HC of non-athletes and without attentional or BAS differences compared to the other HC of athletes. The results also showed a greater feeling of guilt and negativity in people with AN than in all people from the HC of the more sedentary group. Furthermore, it was proposed that people with AN experience hunger as a reinforcer of their behaviour (Giel et al., 2013). The study by Jappe et al. (2011) observed higher BIS and BAS in people with AN compared to HC, with special emphasis on the high score on the anxiety and fear BIS subscales, as well as the low score on the BAS reinforcer-seeking subscale. This study concluded with the possibility that people with AN had a hypersensitive motivational system. Finally, Harrison et al. (2011) described higher pleasure-seeking BAS values in the HC, as well as higher BIS values in the group with AN. The study also found no intragroup differences in the BAS values of the ED group.

The studies collected for this section show, in general, an association between BIS and AN. The use of neuroimaging tests in the study by Bernardoni et al. (2018) further validates these results, since differences have been found between people with AN and healthy people in the neural bases of learning through discipline.

As for the associations of BAS with AN, the studies collected observed that BAS was not associated differently with the symptoms of AN than with those of BN (Harrison et al., 2011; Kanakam et al., 2017; Monteleone et al., 2014). The studies also showed no differences in the comparison between cases and controls (Giel et al., 2013). The negative correlation between BAS and the time with the diagnosis of EDs does stand out as relevant (Kanakam et al., 2017).

The 10 studies that collect information on relationship B are summarized in Table 2.

3.3 | Relationship C between IAS, BIS and BAS motivational systems, and AN

In this section, all the studies included are cross-sectional. The description of the data is divided according to the search between those that analysed the IAS-AN (A) and then later offered data on personality and those considering the personality in the search terms of IAS-BIS/BAS-AN (C) from the outset.

TABLE 1 Selection of studies investigating IAS-AN.

Author/year	Participants (n)	Age (years)	Female %	Diagnoses	Test (attachment)	Attachment style	Results
Cascino 2022	ED-50 HC-20	AVE high avoidant 24 AVE low avoidant 27 AVE HC 26	100%	27 AN-R 23 BN	ECR	Anxious Avoidant	27 AN and 23 BN: • 11 AN + 9 BN ↑ anxious • 16 AN + 14 BN ↓ anxious • 16 AN + 16 BN ↑ avoidant • 11 AN + 7 BN ↓ avoidant
Katznelson 2021	AN-16 HC-0	18-48	100%	10 AN-Typical 6 AN-Atypical	AAI	Avoidant Anxious Secure	9 AN-Avoidant 4 AN-Anxious 3 AN-Secure (81.3% insecure)
Amianto 2021	AN-41 HC-82	16-30	100%	30 AN-R 11 AN-P	ASQ	Anxious	Anxious attachment-OC Symptoms-AN Higher anxious in AN than HC
Monteleone 2021	AN-150 HC-0	AVE 22-23	100%	127 AN-Typical 23 AN-Atypical Comorbid diagnoses	ASQ	Anxious Avoidant	Insecure attachment and confident in body sensations explain 45% AN symptomatology
Monteleone 2019	ED-52 HC-0	AVE 23.19 ED-↑ anxious AVE 27.13 ED-↓ anxious AVE 25.30 ED-↑ avoidant AVE 23.19 ED-↓ avoidant	100%	29 AN 17 AN-Typical 12 AN-Atypical 24 AN-R 5 AN-P 23 BN	ECR	Anxious Avoidant	N 21 EDs-high anxious (low 31) • 8 AN-Typical • 5 AN-Atypical • 8 BN N 34 EDs-high avoidant (low 18) • 12 AN-Typical • 7 AN-Atypical • 15 BN No differences ANs-BNs
Monteleone 2018b	ED-78 HC-0	AVE AN 24.8	100%	38 AN-R 5 AN-P 35 BN	ECR	Avoidant Anxious	ED-Avoidant style • N high 53 • N low 25 ED-Anxious style • N high 33 • N low 45 No differences between diagnoses
Monteleone 2017	ED-113 HC-117	18-60	100%	71 AN 52 BN	ECR	Anxious Avoidant	IAS-embodiment ED (AN and BN) (transdiagnostic focus)
Redondo 2021	AN-38 HC-323	AN 13-30 AVE HC 19.1	100%	38 AN	CaMir	Anxious Avoidant Not organized	All IAS-alexithymia-AN Fully mediated
Redondo 2018	AN-38 HC-323	AN 13-30 AVE HC 19.1	100%	38 AN	CaMir	Anxious Avoidant Not organized (U)	Anxious dieting ($r = 0.14, p < 0.01$) Avoidant dieting ($r = 0.31, p < 0.01$) Not organized dieting ($r = 0.24, p < 0.01$)
Nalbant 2020	AN-43 HC-37	12-18	100%	38 AN-R 5 AN-P	IPPA	Secure Anxious Avoidant	AN → ↓ attachment security HC → ↑ attachment security

(Continues)

TABLE 1 (Continued)

Author/year	Participants (n)	Age (years)	Female %	Diagnoses	Test (attachment)	Attachment style	Results
Nandirino 2020	AN—63	AVE AN 19.54	100%	63 AN-R	ECR	Avoidant	Anxious and avoidant—very bad intrapersonal and bad interpersonal—AN
	HC—63	AVE HC 19.98				Anxious	
Batista 2018	AN—35	11–19	100%	32 AN-R 9 AN-P	ECR-R	Avoidant Anxious	AN—↑ anxious and avoidant insecure attachments ($t = 2.33, p = 0.02$) Insecure is not predictor
	HC—35						
Pace 2017	ED—50	ED 16–25	100%	25 AN 25 BN	AAI	Avoidant Not organized	ED > HC both IAS
	HC—50	AVE HC 20					
Pace 2016	AN—25	14–18	100%	22 AN-R 3 AN-P	AAI	Secure (F/A) Anxious (E) Avoidant (Ds) Not organized (U) Not classified (CC)	AN group ($n = 24$): (F/A) $n = 6$ (E) $n = 1$ (Ds) $n = 11$ (U/CC) $n = 6$ IAS ↑
	HC—25						HC ($n = 25$): (F/A) $n = 13$ (E) $n = 0$ (Ds) $n = 8$ (n = 3) (CC) $n = 0$

Abbreviations: AAI, Adult Attachment Interview; AN, anorexia nervosa; AN-P, anorexia nervosa binge/purge type; AN-R, anorexia nervosa restrictive type; ASQ, Attachment Style Questionnaire; AVE, average; BN, bulimia nervosa; ECR, Experiences in Close Relationships; ED, eating disorder; HC, healthy control group; IAS, insecure attachment style; IPPA, Inventory of Parent and Peer Attachment; OC, obsessive-compulsive symptoms.

3.3.1 | The results of (A) that are valid for (C): The IAS–personality–AN relationship

As previously mentioned, the review of (A) references to personality as a mediator of the IAS–AN relationship has already been observed. Lazarević et al. (2016) showed that the variables of avoidance, perfectionism and concern for the body were presented as predictors of AN, with the IAS as an aggravating factor of the AN symptoms in their association.

Münch et al. (2016) considered factors from Eysenck's model, such as introversion/extroversion in the comparison between the group with AN and the HC. They also studied the IAS–AN relationship, finding a higher frequency of IAS in the sample with AN. Finally, the study by Dakanalis et al. (2014) observed a mediation of perfectionism between the IAS–AN association.

The results collected on personality describe the importance of analysing certain personality variables as relevant elements in the study of the IAS–AN relationship.

3.3.2 | About the IAS–BIS/BAS–AN relationship

The study by Monteleone, Cardi, et al. (2018) found a mediating role for BIS in the association between anxious IAS and EDs with restrictive symptomatology. The study found no differences between the ED subgroups and HC in their relationship with BAS. They mentioned anxious attachment as an independent variable, BIS as a mediator and AN as a dependent variable (Monteleone, Cardi, et al., 2018). Also, De Paoli et al. (2017) observed a positive correlation between avoidant and anxious IAS, interpersonal rejection sensitivity and eating symptoms as drivers towards weight loss and bulimia (De Paoli et al., 2017). Moreover, Keating et al. (2016) wrote that anxious and avoidant IAS, along with depressive symptoms, is associated with AN, with BIS as a mediator. Attachment styles and depressive symptoms explained 59% of the variance of AN mediated by BIS, compared to 19% of the variance of the same relationship in HC (Keating et al., 2016).

The results of the studies described reveal an association between the IAS, the BIS motivational system and AN (Keating et al., 2016). They also observe IAS as a preceding variable, with BIS as a mediator, and AN as a dependent variable (Monteleone, Cardi, et al., 2018). In addition, other related variables were observed, such as depressive symptoms and sensitivity to interpersonal rejection, interpreted as a mode of sensitivity to punishment (De Paoli et al., 2017) (see Table 3).

3.4 | Risk of bias

The Newcastle–Ottawa Scale was used to assess risk of bias (Wells et al., 2014). Table 4 shows that, of the 30 included studies, 22 studies had a low risk of bias (73.3%), while 8 had a high risk of bias (26.6%). Most of the studies with a high risk of bias are due to the experimental group not being compared with an equivalent healthy control

TABLE 2 Selection of studies investigating BIS/BAS-AN.

Author/year	Participants (n)	Age (years)	Female %	Diagnoses	BIS/BAS test	Results
King 2021	AN-68 HC-49	12-28	100%	43 AN underweight 25 AN recov.weight	The BIS/BAS scales	↓ BMI-↑ BIS-↑ AN BIS: AN > HC Only ↓ BIS participants learn from punishment
Jonker 2020	AN-69 HC-69	12-23	97%	39 AN-R 10 AN-P 11 atypical AN-R 9 atypical AN-P	The BIS/BAS scales	AN-↑ BIS (robust evidence)
Bernardoni 2018	AN-36 HC-36	12-24	100%	36 AN underweight	The BIS/BAS scales MRI	The neural basis of learning selectively switches to punishment in AN vs. HC No age influences, extreme BMI or punishment avoidance
Kanakam 2017	Participants: Twins = 112 ED-50 Unaffected-19 HC-42	16-60	100%	26 BD (BN, EDNOS-BN) 24 AN (AN-R, AN-P, EDNOS-AN)	The BIS/BAS scales AMS	↓ BMI-BIS ↑ ↓ duration ED-BAS ↓ ↓ fasting or dieting-BAS ↓ ↑ abuse of laxatives-BAS ↑ ↑ Appetitive motivation-BAS ↑ ↑ age-BAS ↑ HC-high BAS than ED (AN and BD) Monozygotic twins with AN or BD-↓ BAS Not for dizygotic
Harrison 2016	ED-71 HC-0	AVE 26.6	85.7%	25 AN-R 24 AN-P 20 EDNOS-AN 2 EDNOS-BN	The BIS/BAS scales (Carver & White, 1994)	Changes in BIS/BAS no significant pre-post ED > HC in BIS ED < HC in BAS
Harrison 2011	ED-121 Post-ED-74 HC-91	AVE ED 34.21 AVE post-ED 35.25 AVE HC 31.79	100%	84 AN 29 AN-R 55 AN-P 34 BN	The BIS/BAS scales	AN-R < HC BAS-FS ED > HC BIS AN-R = BN BAS
Monteleone 2014	ED-48 HC-19	AVE AN-P 31.8 AVE AN-R 26.9 AVE BN 28 AVE HC 26.5	100%	25 AN 13 AN-P 12 AN-R 23 BN	The BIS/BAS scales	BIS-ED > BIS-HC BAS-AN = BN = HC
Glashouwer 2014	AN-165 HC-72	AVE 15	100%	117 AN-R 48 AN-P	SPSRQ	AN-↑ BIS AN-P > AN-R AN-↑ BAS BIS/BAS AN predictor
Giel 2013	AN-15 HC-Athletes-15 HC-Non-Athletes-15	Adults	100%	9 AN-R 6 AN-P	The BIS/BAS scales	BAS and attentional engagement AN > HC

(Continues)

TABLE 2 (Continued)

Author/year	Participants (n)	Age (years)	Female %	Diagnoses	BIS/BAS test	Results
Jappe 2011	AN—31 HC—33	12–45	100%	22 AN-R 9 AN-P	The BIS/BAS scales SPSRQ	<p>↑ levels of guilt and negative affect when unable to exercise</p> <p>AN > HC</p> <p>AN is maintained by a pursuit of reward (hunger as R+)</p> <p>AN > HC in BIS ($p < 0.00001$)</p> <p>AN > HC in BAS ($p < 0.005$)</p> <p>↑ BIS anxiety and fear</p> <p>↓ BAS-FS</p> <p>↑ motivational system sensitivity</p>

Abbreviations: AMS, Appetite Motivation Scale; AN, anorexia nervosa; AN-P, anorexia nervosa binge/purge type; AN-R, anorexia nervosa restrictive type; AVE, average; BAS, behavioural activation system; BIS, behavioural inhibition system; BMI, body mass index; BN, bulimia nervosa; ED, eating disorder; EDNOS, eating disorder not otherwise specified; FS, fun seeking; HC, healthy control group; MRI, magnetic resonance imaging; R+, positive reward; SPSRQ, Sensitivity to Punishment and Sensitivity to Reward Questionnaire.

group, as observed in Dakanal et al. (2014), Harrison et al. (2016), Katznelson et al. (2021), Monteleone, Patriciello, et al. (2018) or Monteleone et al. (2019, 2021). The study by Lazarević et al. (2016) presents a medium risk of bias due to the lack of an adequate definition or representativeness of its experimental group (see Table 4).

4 | DISCUSSION

The aim of this study was to analyse the evidence of the relationship between IASs, motivational systems and AN. The goal was to find common elements that could create a framework of interaction between these variables. Thirty investigations have been collected and analysed, and the results were organized according to the associations between the variables IAS-AN (A), BIS/BAS-AN (B) and IAS-BIS/BAS-AN (C).

Regarding the (A) relationship, it has been observed that family relationship styles may be relevant drivers of EDs, as demonstrated in previous studies (Gismero, 2020; Quiles et al., 2013; Wallin & Saha, 2020). Avoidant IAS has been more associated with AN than BN and HC (Cascino et al., 2022; Katznelson et al., 2021; Monteleone, Patriciello, et al., 2018; Redondo & Luyten, 2021). Anxious IAS was also associated with AN and BN to a greater degree than with HC (Amianto et al., 2021; Batista et al., 2018; Pace et al., 2016). Disorganized IAS has been associated more closely with all EDs rather than with HC (Pace et al., 2016).

Regarding the (B) relationship, the results showed that behavioural inhibition and sensitivity to punishment (BIS) were more strongly associated with AN than with HC (Glashouwer et al., 2014; Jonker et al., 2020), as shown in the literature (Becerra, 2010; Minnick et al., 2017). However, Kanakam et al. (2017) found a negative correlation between appetitive motivation of the BAS and some restrictive symptoms, such as fasting or diet abuse.

However, the results of the relationship between BAS and AN are contradictory, with opposing data being observed between the studies collected, as well as in comparison with what was expected (Becerra, 2010). For example, the study by Giel et al. (2013) described a greater relationship between BAS and the HC of non-athletes than with people with AN and found no differences with respect to another HC of athletes. Harrison et al. (2011, 2016) observed a lower association of BAS with HC than with AN. Finally, Kanakam et al. (2017) found a negative correlation between BAS and restrictive symptoms and diet abuse (Kanakam et al., 2017).

In the study of the association of the three variables (C), the restrictive profile of AN, being most associated with the avoidant IAS, suggests dysfunctional avoidance of reinforcement, in this case food, as a primary reinforcer. Social support is a secondary reinforcer (Keating et al., 2016). The ambivalent profile of BN, consisting of alternating periods between binge eating or purging with restrictive phases of intake, could explain this direct relationship. This is also the case with avoidant IAS (Keating et al., 2016) and with anxious IAS (Monteleone, Cardi, et al., 2018). This may be due to the fact that a person with BN is more inclined to actively seek out social

TABLE 3 Selection of studies investigating IAS–BIS/BAS–AN.

Author/year	Participants (n)	Age (years)	Female %	Diagnoses	Tests	Attachment style	Results
Monteleone 2018a	ED–78 HC–45	AVE AN 25.15 AVE BN 27	100%	38 AN-R 10 AN-P 30 BN	The BIS/BAS scales ASQ	Avoidant and anxious BIS/BAS subtypes	AN > HC in BIS AN = HC in BAS Anxious A-BIS–ED (restrictive) BN ≠ AN-P in BAS
De Paoli 2017	ED–122 HC–622	AVE 25.16	98%	56 AN-R 17 AN-P 17 BN 10 BE 22 OED + EDNOS	ECR-R Rejection Sensitivity Questionnaire (RSQ; Downey & Feldman, 1996)	Anxious and avoidant	Avoidant and anxious ED ED > HC in interpersonal rejection sensitivity (RS) Both avoidant and anxious → appearance-based RS + low social rank → drive for thinness or bulimia
Keating 2016	AN–24 HC–26	AVE AN 23.1 AVE HC 22.6	100%	23 AN-R 1 AN-P	SPSRQ (Torrubia et al., 2001) ASQ	Avoidant and anxious BIS/BAS	AN = HC in BAS AN–BIS–Anxious and avoidant attachment Anxious and avoidant and depressive symptoms → 59% BIS in AN
Münch 2016	ED–106 HC–147	AVE 26	100%	45 AN 29 BN 12 OED 20 exceeded the clinical cut-off (no diagnoses)	AAS The Experiences in Personal Social Systems Questionnaire (EXIS-pers) Big Five Personality Test (B5T)	Clingy/dependent Rejecting/distant Anxious/avoidant Extroversion Neuroticism Negative family experiences	IAS ED > HC Neuroticism ED > HC Introversion IAS–introversion–ED Negative experiences in family ED > HC IAS–neg. EXP.–ED ED high severity–low extro + high neuro + negative experiences in family
Lazarević 2016	AN–38 HC–462	20–25	100%	38 AN diagnosed with an EAT test	ECR	Anxious and avoidant	AN–81.6% insecure attachment (anxious and avoidant) IAS AN ≠ HC Avoidance, perfectionism and concern about body shape are significant predictors of symptoms of AN
Dakanalis 2014	ED–411 HC–0	AVE 25.33	100%	101 AN 167 BN 135 EDNOS	ASQ	Anxious and avoidant	Anxious–maladaptive perfectionism–ED (fully mediated) Avoidant–maladaptive perfectionism–ED (partially) Avoidant → ED direct path

Abbreviations: AAS, Adult Attachment Scale; AN, anorexia nervosa; AN-P, anorexia nervosa binge/purge type; AN-R, anorexia nervosa restrictive type; ASQ, Attachment Style Questionnaire; AVE, average; BAS, behavioural activation system; BE, binge eating disorder; BIS, behavioural inhibition system; BN, bulimia nervosa; ECR, Experiences in Close Relationships; ED, eating disorder; EDNOS, eating disorder not otherwise specified; HC, healthy control group; IAS, insecure attachment style; OED, other eating disorder; SPSRQ, Sensitivity to Punishment and Sensitivity to Reward Questionnaire.

TABLE 4 Risk of bias assessment.

Studies (n = 30)	Selection				Comparability		Exposure			Total score (max. 9 points)
	Adequate	Representative	Selection	Definition	1 or >1 outcomes		Ascertainment	Same method	Non- response rate	
Nalbant 2020	*	*		*	*	*	*	*	*	8
Batista 2018	*	*	*	*	*	*	*	*	*	8
Katznelson 2021	*	*			*	*	*			4 (no HC)
Amianto 2021	*	*	*	*	*	*	*		*	8
Nandrino 2020	*	*		*	*	*	*		*	5 (no HC)
Monteleone 2018b	*	*			*	*	*			5 (no HC)
Pace 2017	*	*	*	*	*	*	*	*	*	8
Monteleone 2021	*	*			*	*	*			4 (no HC)
Monteleone 2019	*	*			*	*	*			5 (no HC)
Cascino 2022	*	*	*	*	*	*	*	*	*	9
Redondo 2021	*	*	*	*	*	*	*	*	*	9
Redondo 2018	*	*	*	*	*	*	*	*	*	9
Monteleone 2017	*		*	*	*	*	*	*	*	8
Pace 2016	*	*	*	*	*	*	*	*	*	9
Monteleone 2014	*	*	*	*	*	*	*	*	*	9
Kanakam 2017	*	*		*	*	*	*	*	*	7
Harrison 2011	*	*	*	*	*	*	*	*	*	7
Harrison 2016	*	*			*	*	*			4 (no HC)
King 2021	*	*	*	*	*	*	*	*	*	8
Jonker 2020	*	*	*	*	*	*	*	*	*	9
Bernardoni 2018	*	*			*	*	*	*	*	7
Giel 2013	*	*	*	*	*	*	*	*	*	9
Jappe 2011	*	*	*	*	*	*	*	*	*	9
Glashouwer 2014	*	*	*	*	*	*	*		*	7
Monteleone 2018a	*	*	*	*	*	*	*	*	*	9
Keating 2016	*	*	*	*	*	*	*		*	8
De Paoli 2017	*	*	*	*	*	*	*	*	*	9
Dakanalis 2014	*	*			*	*	*			4 (no HC)

TABLE 4 (Continued)

Studies (n = 30)	Selection				Comparability 1 or >1 outcomes	Exposure			Total score (max. 9 points)
	Adequate	Representative	Selection	Definition		Ascertainment	Same method	Non- response rate	
Lazarević 2016			*	*	*	*	*	*	6
Münch 2016			*	*	*	*	*	*	7

Note: We have used asterisks to mark in the table those requirements that each article met within the risk of bias assessment. The orange shading of the rows serves to mark those studies with a high risk of bias.

reinforcement (Becerra, 2010; Squillace et al., 2011). However, the person with BN also has deficits in emotional identification and regulation skills (Nandrino et al., 2020). This results in them seeking social reinforcement insatiably (anxious IAS) or failure in their repeated attempts to achieve it. They also prefer autonomy (Dakanalis et al., 2014). The lower association found between anxious IAS with AN than with BN (Monteleone, Patriciello, et al., 2018) supports this theory. Finding evidence of BIS mediation in the IAS-AN association, and even causality in the relationship (Monteleone, Cardi, et al., 2018), we can interpret that avoidant attachment with caregivers can be aggravated by the perception of the hypersensitive motivational system to punishment in people with AN (Glashouwer et al., 2014; Jappe et al., 2011).

If we cross-examine these data points with those collected on the disorganized IAS as an indication of experiencing a traumatic family experiences, the traumatic events can be associated with a rejection of the family by the person suffering from AN (Pace et al., 2016) and therefore an increase of BIS (De Paoli et al., 2017). Likewise, since disorganized attachment is more present in people with EDs than in healthy people, this type of attachment can be considered a common transdiagnostic element within EDs (Lecannelier et al., 2011). Furthermore, the relationship that exists between anxious IAS and AN (Amianto et al., 2021; Batista et al., 2018; Monteleone, Cardi, et al., 2018), and BAS and AN (Giel et al., 2013; Glashouwer et al., 2014; Jappe et al., 2011), suggests the rejection of the categorical approach and the choice of the dimensional approach. This is the case because AN is also related to these variables, but to a lesser degree than avoidant IAS (Katznelson et al., 2021) and BIS variables (Jonker et al., 2020).

Finally, other personality variables, such as perfectionism or neuroticism, can strengthen the IAS-AN relationship (Dakanalis et al., 2014; Lazarević et al., 2016). Polarized introversion or extroversion, found in the study by Münch et al. (2016), is another important personality variable in this relationship. Regarding the emotional identification variables, alexithymia has been shown to be a mediator in the positive IAS-AN relationship (Redondo & Luyten, 2021). For this reason, the study by Redondo and Luyten (2021) suggests that the preference for autonomous emotional regulation may be associated with an inability to identify one's own emotions and thus be related to the symptoms of AN.

4.1 | The transdiagnostic framework of the three related dimensions of ED

The proposed model is derived from the results of the review and aims to offer an alternative explanation of the interaction of the variables, create potential avenues for formulating new approaches and, eventually, resolve the contradictions observed. The study has been inspired by Fairburn's transdiagnostic theory (Cortés-García et al., 2022; Fairburn et al., 2003), among others. Although the study focused on obtaining data on AN, the results obtained on the interaction of the IAS and the BIS/BAS with BN have been used as well. In this way, a deeper understanding of their interaction has been created.

It is a model in which the variables IAS, BIS/BAS and ED work as three associated dimensional variables, each one having two poles at its extremes: a restrictive pole, composed of the avoidant IAS, BIS and AN (or other ED with a food restriction nature), and a bulimic-impulsive pole, which is composed of the anxious IAS, BAS and BN (or other ED with a binge eating/purging nature). The variables that share a pole are associated more closely than with those that are located at the opposite pole. The variables of opposite poles are also related as well, but less closely than variables of the same pole. In some cases, variables of the opposite pole can be inversely related (see Figure 2).

In the centre of the image, in the black box, we find the transdiagnostic variables, found mostly in EDs. These variables include trauma and disorganized attachment, perfectionism, neuroticism, alexithymia and emotional regulation difficulties. These variables strengthen the interdimensional interrelationships that make the person vulnerable to suffering from EDs.

4.1.1 | The restrictive pole

Within our framework, in the psychological evaluation of restrictive ED cases, an avoidant attachment style with signs of disorganization and a special sensitivity to punishment will be found with greater probability. In patients this could be represented as a person with strong food restriction symptoms, marked alexithymia with a history of intra-family or interpersonal traumatic situations (e.g., bullying,

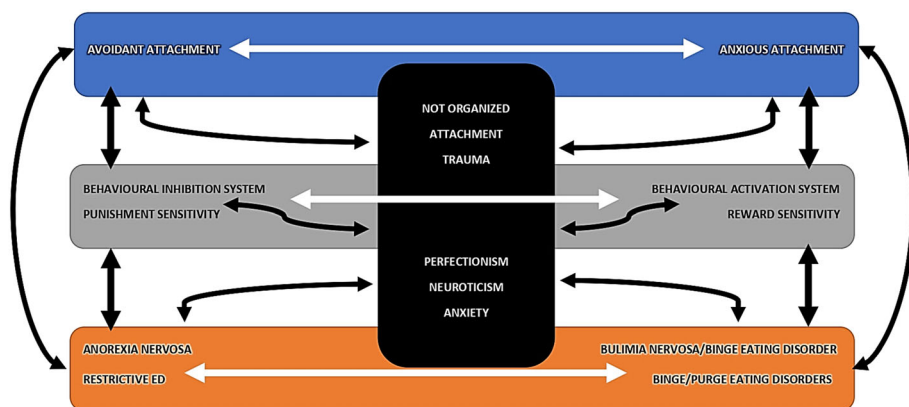


FIGURE 2 Transdiagnostic framework of the three related dimensions of eating disorders.

parental neglect or abuse, etc.). Family conflict would be an additional variable, marked by a communication style with expressed emotion (criticism, hostility and overinvolvement of the parent or guardian). As for personality variables, using Gray's approach, a hypersensitivity to punishment would be observed. In addition, the reinforcing capacity of food could be reversed. This may become a punishment due to the sensation of bloating, overeating and the fear of gaining weight as well as of hunger, which would become a positive reinforcement, due to a subjective sense of control exercised through hyporexia or anorexia. The patient would also, to a lesser extent, show hypersensitivity towards the reinforcement of hunger, increasing the patient's tolerance to it and thus aggravating the problem. Likewise, other personality variables, such as perfectionism and neuroticism, would further aggravate the problem.

4.1.2 | The bulimic-impulsive pole

In the psychological evaluation of a bulimic or BED profiles, an anxious attachment style is more likely to be found, with a high score in disorganized attachment, as well as a special sensitivity to reinforcement. This patient profile would show alexithymia and difficulty or inability to manage their emotions and impulses. Upon analysis, the experience of traumatic situations may also be observed, and a family communication style with high expressed emotion. Hypersensitivity to this reinforcement may lead to dysfunctional self-reinforcing behaviours such as hyperphagia and compensation. This results in the patient developing a tolerance to reinforcement and pushing the affected person to increase the frequency, intensity and duration of this behaviour. They would also have a special sensitivity to punishment, although to a lesser extent than those with AN, so the feeling of fullness and guilt would function as aggravators of the problem, together with perfectionist and neurotic personality styles.

With both poles serving as extremes, clinical cases of EDs would also occur in intermediate situations, with symptoms shared by both poles (bulimarexic disorder). In some cases, the affected people could even oscillate from one pole to the other.

4.2 | Clinical implications of the framework

Firstly, the framework highlights the fact that research in personality psychology from Gray's approach and its relation to EDs is still scarce, and the connection between variables such as those in the framework can reveal modes of interaction that have not been fully considered. Secondly, the theoretical eclecticism stands out as a strong theoretical implication of the framework. This is the case since its design and conclusions are the result of combining different approaches within psychology: cognitive-behavioural, systemic, third-generation therapies and integrative therapies. The study seeks to combine elements of each intervention approach on a rigorous scientific basis. In addition, based on the evidence that supports the framework, a specific treatment could be designed for patients with EDs and concomitant personality disorders (e.g., avoidant, borderline or histrionic).

In the framework, priority would be given to establishing a connection where the patient could feel comfortable in a therapeutic environment. In the first phases, experiential avoidance, myths and dysfunctional beliefs about the body and food as a punishment, impulse control and the search for reward would be worked on. In later phases, after having built trust with the person, work can be done on the feeling of self-efficacy after overcoming the first therapeutic challenges. Finally, aspects of attachment in social relationships and in the family would be worked on, as it is one of the core drivers of the disorder.

It is important to discuss the limitations of the study. First, some of the studies used empirical instruments in which the BAS did not obtain robust enough reliability to make firm statements about its relationship with EDs in the model (e.g., Harrison et al., 2011, 2016; Jonker et al., 2020). Second, contradictory data have been found regarding the relationship between BIS and BN, BAS and both EDs, and the difference between IAS in their association with sub-diagnoses of EDs. Therefore, the proposed relationships should be confirmed in future studies. Third, most studies use instruments that do not measure disorganized/unresolved attachment (ECR and ASQ). For this reason, future research should consider psychometric measurements of this type of attachment to contrast the mode of

relationship of this variable, as well as opt for psychometric measurements with a structured or semi-structured interview. Fourth, this study does not delve into the trauma as a variable due to its complexity requiring a separate review. In future studies, it will be helpful to delve deeper into trauma in the study of the relationship between attachment, motivational systems and EDs, as it is clinically relevant to the treatment of EDs and family therapy. Fifth, the heterogeneity of the primary studies, such as very wide age range, the different types of designs used and the diversity of their methodological quality, allows only a cautious interpretation. Finally, almost all of the studies reviewed had a sample exclusively made up of women, which prevents observing differences based on gender.

When dealing with family relationships, the neurobiological formation of a personality factor and the possible implication of traumatic events, it needs to opt for the longitudinal research design for the observation of attachment, personality and behaviour variables, and family trauma in the different stages of the development of people who end up developing an ED. We must also bear in mind that 20% of the studies collected did not compare their results with a control group, which increases the risk of bias in the results obtained.

Finally, it would be preferable to contrast motivational systems with neuroimaging techniques for the analysis of differential functioning between cases and controls, such as the analysis of differences in the neurobiological functioning of reward and learning systems.

5 | CONCLUSION

The data collected in this review allow us to propose a pioneering framework in the understanding of attachment style as a dimensional variable. The adoption of the dimensional and transdiagnostic approach would bring the research closer to clinical reality, since the categorical approach frequently fails in practice when it comes to establishing an accurate clinical diagnosis.

A core strength of the study is that it has gathered data from a line of research little studied thus far, such as the analysis of the association between the variables insecure attachment, motivational systems and AN. Furthermore, the collection of contradictory data regarding the relationships described allows new research questions to be raised. Subsequent research should opt for the dimensional approach, the longitudinal data collection method and the consideration of the trauma variable in the study of attachment and as a separate variable.

ACKNOWLEDGEMENTS

The views expressed in this study are those of the authors and do not reflect an official position of the universities and institutions funding the study.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflicts of interest.

ETHICS STATEMENT

No ethics approval or participant permissions are included because this study is a systematic review. We did not extract original data from people.

ORCID

José Miguel Budia  <https://orcid.org/0000-0003-1586-1623>

Carlos María Alcover  <https://orcid.org/0000-0001-9632-9107>

Juan José Fernández-Muñoz  <https://orcid.org/0000-0001-5519-7515>

Ascensión Blanco-Fernández  <https://orcid.org/0000-0003-3764-6932>

Miriam P. Félix-Alcántara  <https://orcid.org/0000-0001-5567-2769>

REFERENCES

Studies included in the primary analysis in the systematic reviews based on the PRISMA protocol are marked with an asterisk.

Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. N. (2015). *Patterns of attachment: A psychological study of the strange situation*. Psychology Press. <https://doi.org/10.4324/9780203758045>

*Amianto, F., Secci, I., Arletti, L., Davico, C., Abbate Daga, G., & Vitiello, B. (2022). Obsessive-compulsive symptoms in young women affected with anorexia nervosa, and their relationship with personality, psychopathology, and attachment style. *Eating and Weight Disorders: EWD*, 27, 1193–1207. <https://doi.org/10.1007/s40519-021-01252-y>

Armsden, G. C., & Greenberg, M. T. (1989). *Inventory of Parent and Peer Attachment (IPPA)*. University of Washington Seattle.

Balluerka, N., Lacasa, F., Gorostiaga, A., Muela, A., & Pierrehumbert, B. (2011). Versión reducida del cuestionario CaMir (CaMir-R) para la evaluación del apego. *Psicothema*, 23(3), 486–494.

Barg, G. (2011). Bases neurobiológicas del apego. *Ciencias Psicológicas*, 5(1), 69–81. <http://www.scielo.edu.uy/pdf/cp/v5n1/v5n1a07.pdf>

*Batista, M., Žigić Antić, L., Žaja, O., Jakovina, T., & Begovac, I. (2018). Predictors of eating disorder risk in anorexia nervosa adolescents. *Acta Clinica Croatica*, 57(3), 399–410. <https://doi.org/10.20471/acc.2018.57.03.01>

Becerra, J. (2010). Actividad de los sistemas de aproximación e inhibición conductual y psicopatología. *Anuario de Psicología Clínica y de La Salud/Annuary of Clinical and Health Psychology*, 6(6), 61–65.

*Bernardoní, F., Geisler, D., King, J. A., Javadi, A.-H., Ritschel, F., Murr, J., Reiter, A. M. F., Rößner, V., Smolka, M. N., Kiebel, S. J., & Ehrlich, S. (2018). Altered medial frontal feedback learning signals in anorexia nervosa. *Biological Psychiatry*, 83, 235–243. <https://doi.org/10.1016/j.biopsych.2017.07.024>

Bowlby, J. (1979). The Bowlby-Ainsworth attachment theory. *Behavioural and Brain Sciences*, 2(4), 637–638. <https://doi.org/10.1017/S0140525X00064955>

Brennan, K. A., Clark, C. L., & Shaver, P. R. (1998). *Self-report measurement of adult attachment: An integrative overview*.

Brumariu, L. E., & Kerns, K. A. (2010). Parent-child attachment and internalizing symptoms in childhood and adolescence: A review of empirical findings and future directions. *Development and Psychopathology*, 22(1), 177–203. <https://doi.org/10.1017/S0954579409990344>

Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology*, 67(2), 319–333. <https://doi.org/10.1037/0022-3514.67.2.319>

*Cascino, G., Ruzzi, V., D'Agostino, G., Barone, E., Del Giorno, C., Monteleone, P., & Monteleone, A. M. (2022). Adult attachment style and salivary alpha-amylase and emotional responses to a psychosocial

- stressor in women with eating disorders. *Journal of Psychosomatic Research*, 153(December 2021), 110713. <https://doi.org/10.1016/j.jpsychores.2021.110713>
- Cassoli, E., Rossi, E., Vizzotto, C., Malinconci, V., Vignozzi, L., Ricca, V., & Castellini, G. (2022). Avoidant attachment style moderates the recovery of healthy sexuality in women with anorexia nervosa treated with enhanced cognitive behavior therapy (CBT-E): A 2-year follow-up study. *The Journal of Sexual Medicine*, 19(2), 347–355. <https://doi.org/10.1016/j.jsxm.2021.12.001>
- Collins, N. L., & Read, S. J. (1990). Adult attachment, working models, and relationship quality in dating couples. *Journal of Personality and Social Psychology*, 58(4), 644–663. <https://doi.org/10.1037/0022-3514.58.4.644>
- Cortés-García, L., Martínez-Calvo, C., & Senra, C. (2022). Mediation effect of Fairburn's transdiagnostic mechanisms between attachment to the mother and eating disorder symptoms in a clinical sample. *Frontiers in Psychology*, 13, 852977. <https://doi.org/10.3389/fpsyg.2022.852977>
- Cortés-García, L., McLaren, V., Vanwoerden, S., & Sharp, C. (2021). Attachment, mentalizing, and eating disorder symptoms in adolescent psychiatric inpatients and healthy controls: A test of a mediational model. *Eating and Weight Disorders—Studies on Anorexia, Bulimia and Obesity*, 26(4), 1159–1168. <https://doi.org/10.1007/s40519-020-01017-z>
- Couturier, J., Kimber, M., & Szatmari, P. (2013). Efficacy of family-based treatment for adolescents with eating disorders: A systematic review and meta-analysis. *International Journal of Eating Disorders*, 46(1), 3–11. <https://doi.org/10.1002/eat.22042>
- *Dakanalis, A., Timko, C. A., Zanetti, M. A., Rinaldi, L., Prunas, A., Carrà, G., Riva, G., & Clerici, M. (2014). Attachment insecurities, maladaptive perfectionism, and eating disorder symptoms: A latent mediated and moderated structural equation modeling analysis across diagnostic groups. *Psychiatry Research*, 215(1), 176–184. <https://doi.org/10.1016/j.psychres.2013.10.039>
- *De Paoli, T., Fuller-Tyszkiewicz, M., Halliwell, E., Puccio, F., & Krug, I. (2017). Social rank and rejection sensitivity as mediators of the relationship between insecure attachment and disordered eating. *European Eating Disorders Review*, 25(6), 469–478. <https://doi.org/10.1002/erv.2537>
- Downey, G., & Feldman, S. I. (1996). Implications of rejection sensitivity for intimate relationships. *Journal of Personality and Social Psychology*, 70(6), 1327–1343. <https://doi.org/10.1037/0022-3514.70.6.1327>
- Fairburn, C. G., Cooper, Z., & Shafran, R. (2003). Cognitive behaviour therapy for eating disorders: A “transdiagnostic” theory and treatment. *Behaviour Research and Therapy*, 41, 509–528. [https://doi.org/10.1016/s0005-7967\(02\)00088-8](https://doi.org/10.1016/s0005-7967(02)00088-8)
- Feeney, J., Noller, P., & Hanrahan, M. (1994). *Attachment Style Questionnaire*. Guilford Press.
- Forsén, E., Clinton, D., & Birgegård, A. (2019). The unsafe haven: Eating disorders as attachment relationships. *Psychology and Psychotherapy*, 92(3), 379–393. <https://doi.org/10.1111/papt.12184>
- Fox, J. R., Dean, M., & Whittlesea, A. (2017). The experience of caring for or living with an individual with an eating disorder: A meta-synthesis of qualitative studies. *Clinical Psychology & Psychotherapy*, 24(1), 103–125. <https://doi.org/10.1002/cpp.1984>
- Gander, M., Fuchs, M., Franz, N., Jahnke-Majorkovits, A.-C., Buchheim, A., Bock, A., & Sevecke, K. (2021). Non-suicidal self-injury and attachment trauma in adolescent inpatients with psychiatric disorders. *Comprehensive Psychiatry*, 111, 152273. <https://doi.org/10.1016/j.comppsy.2021.152273>
- George, C., Kaplan, N., & Main, M. (1996). *The Adult Attachment Interview*. Department of Psychology, University of California.
- *Giel, K. E., Kullmann, S., Preißl, H., Bischoff, S. C., Thiel, A., Schmidt, U., Zipfel, S., & Teufel, M. (2013). Understanding the reward system functioning in anorexia nervosa: Crucial role of physical activity. *Biological Psychology*, 94(3), 575–581. <https://doi.org/10.1016/j.biopsycho.2013.10.004>
- Gismero, M. E. (2020). Factores de riesgo psicosociales en los Trastornos de la Conducta Alimentaria: Una revisión y algunas consideraciones para la prevención y la intervención. *Revista de Psicoterapia*, 31(115), 33–47. <https://doi.org/10.33898/rdp.v31i115.354>
- *Glashouwer, K. A., Bloot, L., Veenstra, E. M., Franken, I. H. A., & de Jong, P. J. (2014). Heightened sensitivity to punishment and reward in anorexia nervosa. *Appetite*, 75, 97–102. <https://doi.org/10.1016/j.appet.2013.12.019>
- Gray, J. A. (1970). The psychophysiological basis of introversion-extraversion. *Behaviour Research and Therapy*, 8(3), 249–266. [https://doi.org/10.1016/0005-7967\(70\)90069-0](https://doi.org/10.1016/0005-7967(70)90069-0)
- Grenon, R., Tasca, G. A., Maxwell, H., Balfour, L., Proulx, G., & Bissada, H. (2016). Parental bonds and body dissatisfaction in a clinical sample: The mediating roles of attachment anxiety and media internalization. *Body Image*, 19, 49–56. <https://doi.org/10.1016/j.bodyim.2016.08.005>
- Griffin, D. W., & Bartholomew, K. (1994). *The metaphysics of measurement: The case of adult attachment*.
- *Harrison, A., Sternheim, L., O'Hara, C., Oldershaw, A., & Schmidt, U. (2016). Do reward and punishment sensitivity change after treatment for anorexia nervosa? *Personality and Individual Differences*, 96, 40–46. <https://doi.org/10.1016/j.paid.2016.02.051>
- *Harrison, A., Treasure, J., & Smillie, L. (2011). Approach and avoidance motivation in eating disorders. *Psychiatry Research*, 188(3), 396–401. <https://doi.org/10.1016/j.psychres.2011.04.022>
- Huh, H. J., Jeong, B. R., Hwang, J. H., & Chae, J.-H. (2020). High behavioral inhibition system/behavioral activation system sensitivity, childhood emotional neglect and their interaction as possible related factors for adult attachment style in depression. *Psychiatry Investigation*, 17(2), 122–129. <https://doi.org/10.30773/pi.2019.0165>
- *Jappe, L. M., Frank, G. K. W., Shott, M. E., Rollin, M. D. H., Pryor, T., Hagman, J. O., Yang, T. T., & Davis, E. (2011). Heightened sensitivity to reward and punishment in anorexia nervosa. *The International Journal of Eating Disorders*, 44(4), 317–324. <https://doi.org/10.1002/eat.20815>
- *Jonker, N. C., Glashouwer, K. A., Hoekzema, A., Ostafin, B. D., & de Jong, P. J. (2020). Heightened self-reported punishment sensitivity, but no differential attention to cues signaling punishment or reward in anorexia nervosa. *PLoS ONE*, 15(3), e0229742. <https://doi.org/10.1371/journal.pone.0229742>
- *Kanakam, N., Krug, I., Collier, D., & Treasure, J. (2017). Altered reward reactivity as a behavioural endophenotype in eating disorders: A pilot investigation in twins. *European Eating Disorders Review*, 25(3), 195–204. <https://doi.org/10.1002/erv.2512>
- *Katznelson, H., Daniel, S. I. F., Poulsen, S., Lunn, S., Buhl-Nielsen, B., & Sjögren, J. M. (2021). Disturbances in the experiences of embodiment related to attachment, mentalization and self-objectification in anorexia nervosa. *Journal of Eating Disorders*, 9(1), 137. <https://doi.org/10.1186/s40337-021-00463-z>
- Keating, C., Castle, D. J., Newton, R., Huang, C., & Rossell, S. L. (2016). Attachment insecurity predicts punishment sensitivity in anorexia nervosa. *The Journal of Nervous and Mental Disease*, 204(10), 793–798. <https://doi.org/10.1097/NMD.0000000000000569>
- Kerns, K. A., Klepac, L., & Cole, A. (1996). Security Scale. *Developmental Psychology*.
- *King, J. A., Braem, S., Korb, F. M., Diekmann, L. S., Roessner, V., Steding, J., & Ehrlich, S. (2021). The impact of punishment on cognitive control in a clinical population characterized by heightened punishment sensitivity. *Journal of Abnormal Psychology*, 131(2), 130–140. <https://doi.org/10.1037/abn0000713>
- Lan, X., & Wang, W. (2020). To be shy or avoidant? Exploring the longitudinal association between attachment and depressive symptoms among left-behind adolescents in rural China. *Personality and Individual*

- Differences, 155, 109634. <https://doi.org/10.1016/j.paid.2019.109634>
- *Lazarević, J., Batinić, B., & Vukosavljević-Gvozden, T. (2016). Risk factors and the prevalence of anorexia nervosa among female students in Serbia. *Vojnosanitetski Pregled*, 73(1), 34–41. <https://doi.org/10.2298/vsp1307091211>
- Lecannelier, F., Ascanio, L., Flores, F., & Hoffmann, M. (2011). Attachment & psychopathology: An update review of parental etiological models of disorganized attachment. *Terapia Psicologica*, 29(1), 107–116. <https://doi.org/10.4067/s0718-48082011000100011>
- Linardon, J., Messer, M., & Fuller-Tyszkiewicz, M. (2018). Meta-analysis of the effects of cognitive-behavioral therapy for binge-eating-type disorders on abstinence rates in nonrandomized effectiveness studies: Comparable outcomes to randomized, controlled trials? *The International Journal of Eating Disorders*, 51(12), 1303–1311. <https://doi.org/10.1002/eat.22986>
- Main, M., & Solomon, J. (1990). Procedures for identifying infants as disorganized/disoriented during the Ainsworth Strange Situation. In *Attachment in the preschool years: Theory, research, and intervention* (Vol. 1) (pp. 121–160).
- Martinussen, M., Friberg, O., Schmierer, P., Kaiser, S., Øvergård, K. T., Neunhoffer, A. L., Martinsen, E. W., & Rosenvinge, J. H. (2017). The comorbidity of personality disorders in eating disorders: A meta-analysis. *Eating and Weight Disorders*, 22(2), 201–209. <https://doi.org/10.1007/s40519-016-0345-x>
- Meyer, B. (2002). Personality and mood correlates of avoidant personality disorder. *Journal of Personality Disorders*, 16(2), 174–188. <https://doi.org/10.1521/pedi.16.2.174.22546>
- Minnick, A. M., Cachelin, F. M., & Durvasula, R. S. (2017). Personality disorders and psychological functioning among Latina women with eating disorders. *Behavioural Medicine*, 43(3), 200–207. <https://doi.org/10.1080/08964289.2016.1276429>
- *Monteleone, A. M., Cardi, V., Volpe, U., Fico, G., Ruzzi, V., Pellegrino, F., Castellini, G., Monteleone, P., & Maj, M. (2018). Attachment and motivational systems: Relevance of sensitivity to punishment for eating disorder psychopathology. *Psychiatry Research*, 260, 353–359. <https://doi.org/10.1016/j.psychres.2017.12.002>
- *Monteleone, A. M., Cascino, G., Martini, M., Patriciello, G., Ruzzi, V., Delsedime, N., Abbate-Daga, G., & Marzola, E. (2021). Confidence in one-self and confidence in one's own body: The revival of an old paradigm for anorexia nervosa. *Clinical Psychology & Psychotherapy*, 28(4), 818–827. <https://doi.org/10.1002/cpp.2535>
- *Monteleone, A. M., Castellini, G., Ricca, V., Volpe, U., De Riso, F., Nigro, M., Zamponi, F., Mancini, M., Stanghellini, G., Monteleone, P., Treasure, J., & Maj, M. (2017). Embodiment mediates the relationship between avoidant attachment and eating disorder psychopathology. *European Eating Disorders Review*, 25(6), 461–468. <https://doi.org/10.1002/erv.2536>
- *Monteleone, A. M., Patriciello, G., Ruzzi, V., Fico, G., Pellegrino, F., Castellini, G., Steardo, L. J., Monteleone, P., & Maj, M. (2018). Insecure attachment and hypothalamus-pituitary-adrenal axis functioning in people with eating disorders. *Psychosomatic Medicine*, 80(8), 710–716. <https://doi.org/10.1097/PSY.0000000000000629>
- Monteleone, A. M., Ruzzi, V., Pellegrino, F., Patriciello, G., Cascino, G., del Giorno, C., Monteleone, P., & Maj, M. (2019). The vulnerability to interpersonal stress in eating disorders: The role of insecure attachment in the emotional and cortisol responses to the Trier Social Stress Test. *Psychoneuroendocrinology*, 101, 278–285. <https://doi.org/10.1016/j.psyneuen.2018.12.232>
- *Monteleone, P., Scognamiglio, P., Monteleone, A. M., Perillo, D., & Maj, M. (2014). Cortisol awakening response in patients with anorexia nervosa or bulimia nervosa: Relationships to sensitivity to reward and sensitivity to punishment. *Psychological Medicine*, 44(12), 2653–2660. <https://doi.org/10.1017/S0033291714000270>
- *Münch, A. L., Hunger, C., & Schweitzer, J. (2016). An investigation of the mediating role of personality and family functioning in the association between attachment styles and eating disorder status. *BMC Psychology*, 4(1), 36. <https://doi.org/10.1186/s40359-016-0141-4>
- Murcia, F. M. M., Cangas, A. J., Pozo, E. M., Sánchez, M. M., & Pérez, M. L. (2009). Trastornos de la personalidad en pacientes con trastornos de la conducta alimentaria. *Psicothema*, 21(1), 33–38.
- Murray, S. L., & Holtan, K. F. (2021). Post-traumatic stress disorder may set the neurobiological stage for eating disorders: A focus on glutamatergic dysfunction. *Appetite*, 167, 105599. <https://doi.org/10.1016/j.appet.2021.105599>
- Nalbant, K., Kalayci, B. M., & Akdemir, D. (2020). Attachment security and perceived expressed emotion in adolescents with anorexia nervosa. *Türk Psikiyatri Dergisi*, 31(1), 22–30.
- *Nandrin, J.-L., Dodin, V., Cottencin, O., & Doba, K. (2020). Effect of intrapersonal emotional competences on the relationship between attachment insecurity and severity of eating disorder symptoms in patients with restrictive anorexia. *Journal of Clinical Psychology*, 76(3), 476–492. <https://doi.org/10.1002/jclp.22877>
- Ochsner, K. N. (2008). The social-emotional processing stream: Five core constructs and their translational potential for schizophrenia and beyond. *Biological Psychiatry*, 64(1), 48–61. <https://doi.org/10.1016/j.biopsych.2008.04.024>
- Oldham-Cooper, R., Semple, C., & Wilkinson, L. L. (2021). Reconsidering a role for attachment in eating disorder management in the context of paediatric diabetes. *Clinical Child Psychology and Psychiatry*, 26(3), 669–681. <https://doi.org/10.1177/1359104520986215>
- Pace, C. S., Guiducci, V., & Cavanna, D. (2016). A controlled study of attachment representations and emotion regulation in female adolescents with anorexia nervosa. *Mediterranean Journal of Clinical Psychology*, 4(1).
- *Pace, C. S., Guiducci, V., & Cavanna, D. (2017). Attachment in eating-disordered outpatients with and without borderline personality disorder. *Journal of Health Psychology*, 22(14), 1808–1818. <https://doi.org/10.1177/1359105316636951>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *Systematic Reviews*, 10(1), 89. <https://doi.org/10.1186/s13643-021-01626-4>
- Parker, G., Tupling, H., & Brown, L. B. (1979). A Parental Bonding Instrument. *British Journal of Medical Psychology*, 52, 1–10. <https://doi.org/10.1111/j.2044-8341.1979.tb02487.x>
- Pignatelli, A. M., Wampers, M., Lorieo, C., Biondi, M., & Vanderlinden, J. (2017). Childhood neglect in eating disorders: A systematic review and meta-analysis. *Journal of Trauma & Dissociation: The Official Journal of the International Society for the Study of Dissociation (ISSD)*, 18(1), 100–115. <https://doi.org/10.1080/15299732.2016.1198951>
- Quiles, Y., Quiles, M. J., Pamies, L., Botella, J., & Treasure, J. (2013). Peer and family influence in eating disorders: A meta-analysis. *European Psychiatry: The Journal of the Association of European Psychiatrists*, 28(4), 199–206. <https://doi.org/10.1016/j.eurpsy.2012.03.005>
- *Redondo, I., & Luyten, P. (2021). Alexithymia mediates the relationship between insecure attachment and eating disorder symptoms. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, 39(4), 491–508. <https://doi.org/10.1007/s10942-020-00381-0>
- *Redondo, I., & Luyten, P. (2018). The mediating role of mentalizing between attachment and eating disorders. *Bulletin of the Menninger Clinic*, 82(3), 202–223. <https://doi.org/10.1521/bumc.2018.82.3.202>
- Rodriguez, G. (2008). Validación del método de la situación extraña de Mary Ainsworth en niños argentinos entre 1 y 3 años de edad. In *XV Jornadas de Investigación y Cuarto Encuentro de Investigadores en Psicología del Mercosur*. Facultad de Psicología-Universidad de Buenos Aires.

- Rosenberg, T., Lahav, Y., & Ginzburg, K. (2023). Child abuse and eating disorder symptoms: Shedding light on the contribution of identification with the aggressor. *Child Abuse & Neglect*, 135, 105988. <https://doi.org/10.1016/j.chiabu.2022.105988>
- Shahzadi, K., & Walker, B. R. (2022). Reinforcement sensitivity theory and adult attachment: A replication study. *Current Psychology*, 41(3), 1440–1446. <https://doi.org/10.1007/s12144-020-00685-5>
- Smillie, L. D., & Jackson, C. J. (2005). The Appetitive Motivation Scale and other BAS measures in the prediction of approach and active avoidance. *Personality and Individual Differences*, 38(4), 981–994. <https://doi.org/10.1016/j.paid.2004.09.013>
- Squillace, M., Janeiro, J. P., & Schmidt, V. (2011). El concepto de impulsividad y su ubicación en las teorías psicobiológicas de la personalidad. *Revista Neuropsicología Latinoamericana*, 3(1), 8–18. <https://doi.org/10.5579/ml.2011.0057>
- Szalai, T. D. (2020). Attachment interventions in the treatment of a case of binge eating disorder. *Psychiatria Hungarica: A Magyar Pszichiatriai Társaság Tudományos Folyóirata*, 35(3), 307–321.
- Tasca, G. A., & Balfour, L. (2014). Attachment and eating disorders: A review of current research. *International Journal of Eating Disorders*, 47(7), 710–717. <https://doi.org/10.1002/eat.22302>
- Tasca, G. A., Ritchie, K., Zachariades, F., Proulx, G., Trinneer, A., Balfour, L., Demidenko, N., Hayden, G., Wong, A., & Bissada, H. (2013). Attachment insecurity mediates the relationship between childhood trauma and eating disorder psychopathology in a clinical sample: A structural equation model. *Child Abuse & Neglect*, 37(11), 926–933. <https://doi.org/10.1016/j.chiabu.2013.03.004>
- Torrubia, R., Ávila, C., Moltó, J., & Caseras, X. (2001). The Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ) as a measure of Gray's anxiety and impulsivity dimensions. *Personality and Individual Differences*, 31(6), 837–862. [https://doi.org/10.1016/S0191-8869\(00\)00183-5](https://doi.org/10.1016/S0191-8869(00)00183-5)
- Wallin, U., & Saha, S. (2020). Implementation of key components of evidence-based family therapy for eating disorders in child and adolescent psychiatric outpatient care. *Frontiers in Psychiatry*, 11, 59. <https://doi.org/10.3389/fpsy.2020.00059>
- Wallis, A., Miskovic-Wheatley, J., Madden, S., Rhodes, P., Crosby, R. D., Cao, L., & Touyz, S. (2018). Family functioning and relationship quality for adolescents in family-based treatment with severe anorexia nervosa compared with non-clinical adolescents. *European Eating Disorders Review: The Journal of the Eating Disorders Association*, 26(1), 29–37. <https://doi.org/10.1002/erv.2562>
- Wells, G. A., Shea, B., O'Connell, D., Peterson, J., Welch, V., Losos, M., & Tugwell, P. (2014). The Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomised studies in meta-analyses.

How to cite this article: Budia, J. M., Alcover, C. M., Fernández-Muñoz, J. J., Blanco-Fernández, A., & Félix-Alcántara, M. P. (2023). Attachment, motivational systems and anorexia nervosa: A systematic review and proposed framework for eating disorders. *Clinical Psychology & Psychotherapy*, 30(5), 913–930. <https://doi.org/10.1002/cpp.2845>